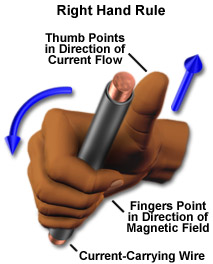
Jeff Joven, Ian Nutter, Scott Spear

Magnets

Main Idea #1:

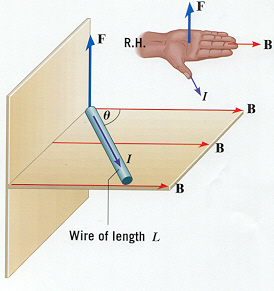
**The right hand rule is to figure out the direction of the magnetic field if you know the direction of the current or of a moving positive charge.**

Your right thumb points in the direction of the current or moving positive charge.

Your fingers curl in the direction of the magnetic field.

For example, if the current is coming out of the page then the magnetic field is counter clockwise.

**The right palm rule is used to figure out the direction of the force on a moving charge in a magnetic field.**

Your thumb still represents the direction of the moving charge and the rest of your fingers now represent the direction of the magnetic field.

An “X” is used to tell when a quantity (like magnetic field) is going into the page.

A dot is used when a quantity is going out of the page.

Main Idea #2:

**Electromagnetic induction can be produced if a wire moves through a magnetic field and an electric current can flow.**

The current depends on the angle between the velocity of the wire and the magnetic field. To produce the maximum current, the wire has to be moving at right angles to the field.

**EMF (Electromotive Forces) is the potential difference between moving wires. EMF is measured in volts.**

The formula to solve for EMF is: EMF = BL*v*sinAngle

The common way to build an EMF is to insert a magnet into a coil of wire or rotate a wire in a magnetic field. The more loops it has, the greater the voltage it produces.

Example Problem:

A wire, 0.8m long is moved up at a speed of 18 m/s through a 0.6 T magnetic field pointed in the horizontal direction. Solve for EMF.

Because the magnetic field is pointed horizontally, we can assume the angle is 90 degrees therefore we can simply ignore sinAngle since it equals 1.

EMF = BL*v*sinAngle

EMF = ( 0.8 ) ( 1.8 ) ( 0.6 ) = 8.64 V

Main Idea #3:

**Direct Current means that electrons flow in one direction.**

**Alternating Current means that the electrons vibrate back and forth.**

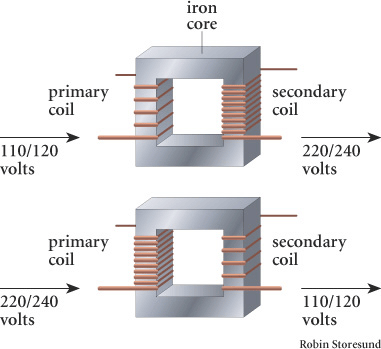
An example of Direct Current is mechanical generators because the field is constantly changing.

An example of Alternating Current is power lines because the voltage goes from 120,000 V to 120 V or 110 V delivering it to our houses.

Main Idea #4:

**Transformers take advantage of alternating current and induction to step or step down the voltage.**

Transformers do **NOT** change the power or energy of the current.

Example #1

The primary side of the transformer is attached to the power source.

The secondary side is attached to the device.

The current of the primary side is represented as Ip, and the secondary side is Is

The voltage on the primary side is Vp and the secondary side is Vs.

The number of turns the primary side has is Np, and on the secondary is Ns.

The equation using those variables is:

Example problem #1:

The voltage across a transformer primary coil that has 200 turns is 30 V. What is the voltage across the secondary coil that has 50 turns?

=

Vs = 7.5 V

­